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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/903,792	07/12/2001	Yasuhiro Nakata	36856.527	1481

7590

02/05/2003

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EXAMINER

SAGAR, KRIPA

ART UNIT

PAPER NUMBER

1756

6

DATE MAILED: 02/05/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/903,792

Applicant(s)

NAKATA ET AL.

Examiner

Kripa Sagar

Art Unit

1756

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 12 July 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,6,11 and 16 is/are rejected.
- 7) ☒ Claim(s) 2-5,7-10,12-15 and 17-20 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 October 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

### Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 5,10,11-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 5,10,15,20 recite the limitation on the conductor pattern being "made of photosensitive paste". The conductor pattern is metallic but is fabricated from a photosensitive paste. The claims refer to the finished conductor pattern which does not have any residual paste. The composition of the conductor pattern is ambiguous and unclear.

Claims 11, 16 recite the steps of "forming a photosensitive conductive paste on a surface of the substrate". This step is vague and indefinite because the conductive paste can be patterned in two distinct ways. In one method, the conductive paste is coated in a pattern and fired. The photosensitive paste is conventionally formed as a film on the substrate and lithographically patterned using a photomask.

This rejection can be overcome by replacing the term "photosensitive conductive *paste*" with "photosensitive conductive *film*" in the claims as appropriate.

Claims 12-15 and 17-20 depend from claims 11, 16.

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claim 1, 6, 11, 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over admitted prior art (APA) in view of the non-patent publication of Licari et al. (Hybrid Microcircuit Technology Handbook, 1998).

The instant invention discloses a method of forming conductors by patterning a photosensitive conductive paste and firing it. The conductor, formed in the shape of an inverted trapezoid, is designed to withstand shear stresses at the corners.

The instant claims recite conductors, wherein the cross-sectional width at the bottom is lesser than that at the top ("inverted trapezoid") and the width at the corners is greater than that on straight segments. The conductors are part of an electronic component and formed from a photosensitive paste using lithography and sintering.

Applicant admits prior art in which conductors formed from a photosensitive paste have the cross-sectional shape of an inverted trapezoid. Shear stresses in the conductor and the narrow contact area with the substrate cause peeling and lifting (p.2-3). The conductors are part of a high frequency, low impedance hybrid inductor (p.1).

The admitted prior art does not teach designing the conductor cross-section.

Licari teaches the art of forming conductor patterns on ceramic substrates (p128 and Fig.16). Adhesion tests and standard adhesion values are provided in Table 6

(p.133). Stress concentrations at sharp corners of structures are conventionally reduced by designing curved segments.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to design conductors with cross-sections to withstand the stresses taught by Licari in fabricating the conductors of an electronic component as revealed by APA.

#### ***Allowable Subject Matter***

5. Claims 2-5, 7-10, 12-15 and 17-20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

6. The following is a statement of reasons for the indication of allowable subject matter:

The instant claims recite design specifications on conductor shape, width and aspect ratios in the corner-segments and straight segments. The cited references teach the inverted trapezoidal shape and the adhesive (shear) stress requirements of the conductors. Applicants' empirical data (p.13-14) show notable improvements in conductor adhesion, with instant design values over conventional designs.

#### ***Conclusion***

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US Pat. 6346564 to Kubota et al. and assigned to the same assignee teaches forming an inductor using conductive paste (Fig.1-3).

Art Unit: 1756

USPGPUB 2002/0076657 to Towata teaches forming conductor lines using photosensitive paste. The lines formed by the conventional process are inverted trapezoid in cross-section and exhibit peeling (Table-2). Linewidths and aspect ratios data are not available. This is not prior art.


USPGPUB 2002/0094382 to Imai et al. teaches forming conductor lines with photosensitive paste. With negative tone paste inverted trapezoidal shapes are printed (fig.2) while the positive tone paste yields trapezoidal cross-sections. This is not prior art.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kripa Sagar whose telephone number is 703-605-4427. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark F Huff can be reached on 703-308-2464. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703.

MH/ks  
January 23, 2003

  
MARK F. HUFF  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 1700